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(54) Title of the invention: Method and Apparatus for Image-controlled Unlocking or Device Starting

(57) The Abstract

This invention relates to a method and apparatus for image-controlled unlocking or device starting. The steps are: inputting images, symbols or characters in a way of hand drawing through a digital circuit or other devices in which images, symbols or characters can be inputted; the inputted images, symbols or characters being processed digitally and being compared with the stored reference data; identifying if the inputted image, symbols or characters are correct, such that the locking or unlocking of the lock apparatus and the starting or shutdown of the device are controlled.

受信時刻 12月31日 10時36分

The Specification

METHOD AND APPARATUS FOR IMAGE-CONTROLLED UNLOCKING OR DEVICE STARTING

The present invention relates to a method and apparatus for image-controlled unlocking or device starting, particularly relates to an image inputting method and apparatus, which digitally processes the inputted images, symbols and characters, and compares them with the previously established image data, serving as the code for controlling the on-off switches.

While the social status is increasingly complicated, the using of on-off control devices is increasingly comprehensive and frequent in our daily life. They have become indispensable tools for anti-theft or starting certain operations. Various kinds of lock systems have been invented, so as to meet with the demands for locking different objects or spaces. Familiar lock systems include bell-mouthed locks, I-shaped locks, cross-shaped locks, magnetic card locks, number-matching locks and electronic password locks, etc. The controlling methods of these locks are also different. Some of them use keys, others not. However, no matter if keys are used, the principle is the same, which is controlling the opening and shutting of the locking system by inputting a set of codes into the lock system, only that various lock systems have different inputting methods, different machineries and different ways and means of code identification.

Taking traditional bell-mouthed locks, I-shaped locks and cross-shaped locks for example, the concave and convex notches on the key are the code for controlling the opening and shutting of the lock system. The key itself is a code inputting and storing means. The core structure of the lock is the identification means. The lock system is

controlled when the key is inserted into the keyhole and the key's concave and convex notches match the core structure of the lock system. The following are the shortcomings of using these locks:

1. In order to unlock the system, you must bring the key with you. If the key is lost because of carelessness, the system would be unable to be unlocked, and this is a frequently happening situation.

2. The code on the key is easy to be modeled. The user usually asks a locksmith to replicate keys, which means that a key can be easily replicated by an ordinary locksmith. Thus, the security level of the code is very low, and it is very likely to create problems.

3. The key and the core structure of the lock are made of metal, after being used for some time, they would be less sensitive because of abrasion. That is to say, all keys having approximate concave and convex notches can be used to unlock the system. By then, the lock system only has the symbolic meaning and no practical meaning.

Taking automatic gate or machinery engine driven by magnetic card lock for example, the key is the magnetic card. The following are the shortcomings in using the magnetic card locks:

1. In order to unlock the system, you must bring the magnetic card. If the magnetic card is lost because of carelessness, the system would be unable to be unlocked, and this is a frequently happening situation for ordinary people.

2. The magnetic card is made of plastic material having low rigidity. They should be kept properly. A little imprudence can make the card snapped. Even if it is only flexed and not snapped, the judgement of the magnetic card may also be affected.

3. If the magnetic card has been close to a magnetic body, its function may be disabled, because its magnetic data may have changed. However, today's world is filled with electronics, many things have magnetic feature, and may bring impact to the magnetic card. High

發證日 12月31日 10年36分

temperature may also change the data stored in the magnetic card.

The machinery number-matching locks and electronic password locks are the combination of a code inputting means and the locking system. They have got rid of the defect of using keys, but still have the following shortcomings: the password employed is only a set of figures, anyone who knows the password can easily control the locking and unlocking. Thus, the security of the password is very important. However, in order to remember it easily, a man would choose a set of figures relevant to himself as the password, most frequently his birthday, ID card number or telephone number. For this reason, the password becomes a "plain code" and loses its security. So the function of the lock system is discounted. Even worse, the starting controls of general arresters also have such a trend, and bring similar troubles to the user.

The primary intention of this invention is to provide an apparatus using hand-drawing images to control locks and to start devices. The main steps are: inputting images, symbols or characters through a digital circuit or other means that can input images, symbols or characters; after digitally processing the inputted images, symbols or characters, comparing them with the reference data stored in the memory, to identify if the inputted images, symbols or characters are correct, such that the opening and shutting of said devices can be controlled, performing the operation of unlocking and device starting without bringing keys, and therefore reducing the chances of losing unlocking components (such as keys).

Secondly, the user may previously establish a password with his name or other characters. Because each person has a unique handwriting style, different handwritings can be used as the reference for comparison, so as to identify different users and decide if the system can be unlocked or if the device can be started.

As to the principles employed, the functions and effects of this

審訂本 12月31日 10時36分

invention, it is clearly explained in the following figures and the descriptions to them:

Fig. 1 is the structural sketch map of this invention.

Fig. 2 is the operational flowchart of this invention.

Fig. 3 is the structural sketch map of another embodiment of this invention.

As shown in Fig. 1, the structural sketch map of this invention, this invention includes an external means 7, which mainly comprises an inputting means 1, inputted data temporary storage means 2, identification and execution means 3 and data storage means 4; Wherein:

The input means 1 comprises a digital circuit, a touch screen or similar input means. Images, symbols or characters can be inputted in handwriting or in other ways.

The inputted data temporary storage means 2 comprises a memory body, which can be RAM (random access memory), DRAM (dynamic random access memory), SRAM (static random access memory), magnetic disk, floppy disk, optical disc or network connected memory means. Their purpose is to store the images, symbols or characters inputted by input means 1 temporarily in the memory body.

The identification and execution means 3 can be a CPU (central processing unit), which orderly executing the previously designed programs.

The data storage means 4 comprises a memory body, which can be ROM (read only memory), PROM (programmable read only memory), EPROM (erasable programmable read only memory), shaded ROM, RAM, DRAM, SRAM, magnetic disk, floppy disk, hard disk, optical disc or network connected memory means. Their purpose is to store the password reference for controlling the unlocking and the previously designed program to be orderly executed by the identification and execution means 3 into the database of this apparatus.

審査 12月31日 10時36分

Further, the output of the inputting means 1 is connected to the input of inputted data temporary storage means 2; the input of the identification and execution means 3 is connected to the output of the inputted data temporary storage means 2 and data storage means 4; the outputs of the identification and execution means 3 are respectively connected to the inputs of the data storage means 4 and the external apparatus 7.

Besides, a computer can be linked with the input means, with its CPU and memory body serving as the inputted data temporary storage means 2, data storage means 4 and the identification and execution means 3. In this way, not only the image or handwriting of the user can be identified, but also the number of people in and out can be tracked.

Fig. 2 is the operational flowchart of this invention (there are many ways of matching the images, not limiting to one method), which includes the following steps:

Inputting image 51: inputting the image in a way of hand drawing on the input means 1, then proceeding to "checking if imputing is over 52";

Checking if inputting is over 52: the identification and execution means 3 identifies if the image inputting process is completed; if "yes", proceeding to the "digitalizing the inputted image 53"; if "no", proceeding to the "inputting image 51" and wait till the inputting process completes, and then continuing the operation.

Digitalizing the inputted image 53: converting the inputted image into digital image data, then proceeding to "eliminating impurities 54";

Eliminating impurities 54, eliminating the impurities of the image data, then proceeding to "integration 55";

Integrating 55: extracting features from the image data, and processing the image into coordinates, line segments and curves, making it an integrated image; then proceeding to "matching if it is correct 56".

Matching if it is correct 56: comparing if the image data is same as the password reference stored in the data storage means 4. If "yes", go to

"sending control signal 57"; if "no", go to "displaying error information 58";

Sending control signal 57: the identification and execution means 3 sending the unlocking control signal or starting the execution signal to the external device 7;

Displaying error information 58: displaying a set of error information to inform the user of the inputting error, and then proceeding to "inputting image 51".

The above execution and control measure can be realized with the identification and execution means 3 orderly executing the program code stored in the data storage means 4, and the inputted image can also be symbols or characters.

Fig. 3 is another embodiment of this invention, mainly comprising a handwriting coordinates inputting means 61, a handwriting digitalization processing means 62, a handwriting feature extraction means 63, an executing action identification means 64 and a handwriting storage means 65, for opening or closing the external device 7; wherein the handwriting coordinates inputting means 61 inputs the users handwriting through digital circuit or other devices that can input the handwriting.

The handwriting digitalization processing means 62 digitalizes the handwriting inputted by the user and eliminates the impurity.

The handwriting feature extraction means 63 processes the handwriting inputted by the user into image, line segments and curves.

The executing action identification means 64 compares the handwriting inputted by the user with the previously stored handwriting, to decide whether to send out a signal of unlocking or starting the device to the external device 7.

The handwriting storage means 65 stores the handwriting for identification.

However, the characters written by a same person are not always the

same. Thus, when comparing if the inputted image is same as the stored password reference, similarity can also serve as the benchmark. The percent of similarity can be adjusted, so as to make it more practicable.

In summary, the method and apparatus for image-controlled unlocking or device starting in this application for invention does have the industrial practicability, novelty and progress.

受理局 12月31日 10時36分

What is Claimed is:

1. A method for image-controlled unlocking or device starting, characterizing in that: wherein the inputting image (51) step is inputting the image in a way of hand drawing, then proceeding to "checking if inputting is over (52)"; the step of checking if inputting is over (52) is that the identification and execution means (3) identifies if the image inputting process is completed, if "yes", proceeding to the "digitalizing the inputted image (53)" step, if "no", proceeding to the "inputting image (51)" step and wait till the inputting process completes, and then continuing the operation; the digitalizing the inputted image (53) step is converting the inputted image into digital image data, then proceeding to "eliminating impurities (54)"; the eliminating impurities (54) step is eliminating the impurities of the image data, then go to "integrating (55)"; the integrating (55) step is extracting features from the image data, and processing the image into coordinates, line segments and curves, making it an integrated image, then proceeding to the "matching if it is correct (56)" step; the matching if it is correct (56) step is comparing if the image data is same as the password reference stored in the data storage means (4), if "yes", proceeding to "sending control signal (57)", if "no", proceeding to "displaying error information (58)"; the sending control signal (57) step is that the identification and execution means (3) sends the unlocking control signal or the execution starting signal to the external device (7); the displaying error information 58 step is displaying a set of error information to inform the user of the inputting error, and then proceeding to "inputting image (51)".

2. The method for image-controlled unlocking or device starting according to Claim 1, characterizing in that: wherein said inputting image (51) step may input images, characters or symbols in a way of handwriting or in other ways.

3. The method for image-controlled unlocking or device starting according to Claim 1, characterizing in that: wherein said matching if it is correct (56) step may also match if the image data is similar to the previously stored password references.

4. The method for image-controlled unlocking or device starting according to Claim 1, characterizing in that: wherein said comparing step may also compare the handwriting inputted by the user with the previously stored handwriting.

5. An apparatus for image-controlled unlocking or device starting, mainly comprising: inputting means (1), inputted data temporary storage means (2), identification and execution means (3) and data storage means (4), characterizing in that: the inputting means (1) comprises a digital circuit and a touch screen; the inputted data temporary storage means (2) comprises a memory body; the identification and execution means (3) can be a CPU; the data storage means (4) comprise a memory body. Further, the output of the inputting means (1) is connected to the input of inputted data temporary storage means (2); the input of the identification and execution means (3) is connected to the output of the inputted data temporary storage means (2) and data storage means (4); the outputs of the identification and execution means (3) are respectively connected to the input of the data storage means (4) and the input of the external apparatus (7).

6. The apparatus for image-controlled unlocking or device starting according to Claim 5, characterizing in that: wherein the memory body of the inputted data temporary storage means (2) can be a random access memory.

7. The apparatus for image-controlled unlocking or device starting according to Claim 5, characterizing in that: wherein the memory body of the inputted data temporary storage means (2) can be a network connected memory means.

8. The apparatus for image-controlled unlocking or device starting according to Claim 5, characterizing in that: wherein the memory body of the data storage means (4) can be a read only memory.

9. The apparatus for image-controlled unlocking or device starting according to Claim 5, characterizing in that: wherein the memory body of the data storage means (4) can be a network connected memory means.

10. The apparatus for image-controlled unlocking or device starting according to Claim 5, characterizing in that: wherein the inputted data temporary storage means (2), the identification and execution means (3) and data storage means (4) can be made up of the CPU and memory body of a computer.

11. The apparatus for image-controlled unlocking or device starting according to Claim 5, characterizing in that: it is mainly comprising a handwriting coordinates inputting means (61), a handwriting digitalization processing means (62), a handwriting feature extraction means (63), an executing action identification means (64) and a handwriting storage means (65).

inputting means
1
inputted data temperory storage means
2
external device
7
identification and execution means
3
data storage means
4

Fig. 1

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Fig. 2

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handwritting coordinates imputting means
61
handwritting digitalization processing means
62
handwritting feature extraction means
63
7
external device
executing action identification means
64
handwritting storage means
65

Fig. 3

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权利要求书2页 说明书4页 附图页数3页

[54]发明名称 用图像控制开锁或装置启动方法及装置

[57]摘要

本发明是有关于一种用图像控制开锁或装置启动方法及装置。其是由数字电路或者其他可输入图像、符合或文字的装置，将图像、符号或文字以手绘方式输入，再将所输入的图像、符号或文字经过数字化处理后与内存的资料做比较，辨别所输入的图像、符号或文字是否正确，而得以控制启闭锁装置的启闭或启动装置的开与关。

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权利要求书

1．一种用图像控制开锁或装置启动的方法，其特征在于：其中输入图像（51）步骤是以手绘方式输入图像，然后进入输入是否完成（52）；输入是否完成（52）步骤是以识别与执行装置（3）识别使用者输入图像是否完成，若为“是”，则进入输入图像数字化（53），若为“否”，则进入输入图像（51），等待输入完成再继续动作；输入图像数字化（53）步骤是将输入的图像转换成数字图像资料，然后进入去除杂点（54），去除杂点（54）步骤是将图像资料的杂点去除，然后进入完整化（55）；完整化（55）步骤是对图像资料抽取特征、座标化、线段化或曲线化，形成完整图像，然后进入对比是否正确（56）；对比是否正确（56）步骤是将图像资料与资料保存装置（4）中所储存的密码资料进行对比是否相同，若为“是”，则进入送出控制讯号（57），若为“否”，则进入显示错误讯息（58），送出控制讯号（57）步骤是以识别于执行装置（3）送出控制开锁或自动执行讯号至外部装置（7）；显示错误讯息（58）步骤是显示一错误讯息让使用者了解输入错误再进入输入图像（51）。

2．如权利要求 1 所述的用图像控制开锁或装置启动的方法，其特征在于：其中所述的输入图像（51）步骤可以手写或其他方式输入图形、文字或符号。

3．如权利要求 1 所述的用图像控制开锁或装置启动的方法，其特征在于：其中所述的对比是否正确（56）步骤也可将图像资料与密码资料进行比较是否相似。

4．如权利要求 1 所述的用图像控制开锁或装置启动的方法，其特征在于：其中所述的对比步骤也可对比使用者输入的笔迹与预存的笔迹。

5．一种用图像控制开锁或装置启动的装置，主要由输入装置（1）、输入资料暂存装置（2）、识别与执行装置（3）和资料保存装置（4）等部份组成，其特征在于：其中输入装置（1）由数字电路、触摸式萤幕所组成，其中资料暂存装置（2）是由记忆体组成，识别与执行装置（3）可由一中央处理单元构成，资料保存装置（4）由记忆体组成；而且，输入装置（1）的输出与输入资料暂存装置（2）的输入相连，识别与执行装置（3）的输入分别与输入资料暂存装置（2）及资料保存装置（4）的输出相连，识别与执行装置（3）的输出分别

与资料保存装置（4）的输入及外部装置（7）的输入相连。

6．如权利要求 5 所述的用图像控制开锁或装置启动的装置，其特征在于：其中输入资料暂存装置（2）的记忆体可为随机存取记忆体

7．如权利要求 5 所述的用图像控制开锁或装置启动的装置，其特征在于：其中输入资料暂存装置（2）可由经网路连线的记忆体装置组成。

8．如权利要求 5 所述的用图像控制开锁或装置启动的装置，其特征在于：其中资料保存装置（4）可由只读记忆体组成。

9．如权利要求 5 所述的用图像控制开锁或装置启动的装置，其特征在于：其中资料保存装置（4）可由经网路连线的记忆体装置组成。

10．如权利要求 5 所述的用图像控制开锁或装置启动的装置，其特征在于：其中输入资料暂存装置（2）、识别与执行装置（3）及资料保存装置（4）可由电脑中的中央处理单元及记忆体装置组成。

11．如权利要求 5 所述的用图像控制开锁或装置启动的装置，其特征在于：其主要由笔迹座标输入装置（61）、笔迹数字化处理装置（62）、笔迹特征抽取装置（63）、执行动作识别装置（64）和笔迹储存装置（65）组成。

专利局 12月18日 16时35分

说明书

用图像控制开锁或装置启动方法及装置

本发明是有关一种用图像控制开锁或装置启动的方法及装置，尤其指一种以图像输入的方法及装置，将所输入的图像、符号或文字予以数字化处理，再对比原设定的图像资料，而作为控制开和关的密码。

随着社会形态的复杂化，人类生活中所需使用的控制开关装置已愈来愈普遍且频繁，成为不可缺少的防盗或启动某作业动作的工具。诸如各式各样的锁具不断推陈出新，以满足不同物品或空间锁制的需求：常见的锁具有喇叭锁、一字锁、十字锁、磁卡锁、对号锁、电子密码锁等等，其控制锁的方法也不相同，有的使用锁匙，有的不使用，但是不论有无使用锁匙，其原理都是相同的，都是将一组密码输入锁具内而得以控制锁制件的开与关，只是各种锁具所使用于开锁的输入方法、装置及辨识密码的方法、装置不同而已。

以传统的一字锁、十字锁及喇叭锁为例，其锁匙上的凹凸刻痕便是控制启闭锁的密码，锁匙本身则是输入与储存密码的装置，辨识装置则为锁心结构；通过锁匙插入锁孔内让锁匙上的凹凸刻痕与锁心结构相配合，而得以控制锁；其使用上有诸多缺点如下所述：

1、 必须携带锁匙才可以开锁，而稍有不慎遗失锁匙，便无法将锁具打开，而这是一般常发生的情形。

2、 锁匙上的密码容易仿制，通常使用者都会找锁匠将锁匙配制，也就是说，一位非常普通的锁匠就可以轻易地将锁匙复制，如此密码的保密性非常低，也就容易出问题。

3、 锁匙及锁心结构一般为金属制品，使用一段时间后便会因为磨损而变得较不灵敏，也就是说锁匙上的凹凸刻痕只要与原锁匙差不多的都可以用来开锁，这个时候，锁具只剩下象征的意义而没有实际的功能。

以磁卡锁启动自动门或机械原动机为例，其锁匙便是磁卡，而磁卡锁的使用上有诸多缺点如下所述：

1、 必须携带磁卡才可以启闭锁，而稍有不慎遗失磁卡，便无法将锁打开，而这也是一般人最常发生的情形：

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2、 磁卡为塑料制品，硬度并不强，必须妥善保存，稍一不慎便可能折断，而即使只是有折痕而没有折断也可能影响磁卡的判断；

3、 磁卡若接近有磁性的物品便可能因磁数据变化而丧失功能，而今日的世界是电子的世界，有很多的东西都有磁性，可能影响到磁卡；而温度太高也会使磁卡所储存的资料改变。

而机械式对号锁及电子密码锁则是将输入密码的装置与锁具结为一体，免除使用锁匙的缺点，但依然有如下所述缺点：其使用的密码仅为一组数字，只要知道密码，任何人都可以轻易的控制启闭锁，因此，密码的保密就格外重要，但是为了容易记忆，一般人都会以与其本身有关的一组数字作为密码，最常见的就是生日、身分证号码、电话号码，也因此使得密码变为“明码”，丧失了保密性也降低了锁的功能；更甚者，一般制动性装置的控制启动，也有如上的趋势，同样造成使用人的困扰。

本发明的主要目的是提供一种以手会图像输入控制锁及启动装置，其主要是由数字电路或者其他可输入图像、符号或文字的装置，输入图像、符号或文字，再将所输入的图像、符号或文字经过数字化处理后与内存的资料做对比，以辨别所输入的图像、符号或文字是否正确，由此得以控制上述装置开与关，以完善不带钥匙即可开启锁或启动装置的操作，并降低开锁元件（如钥匙）遗失。

其次，使用者可预先输入姓名或其他文字作为密码，因为每个人的笔迹不近相同，利用不同的笔迹作为对比的基准，来辨别使用者的不同，而决定是否能开锁或装置启动与否。

至于本发明所应用的原理、作用与功效，则参照下列各图及所作的说明即可完全明了：

图 1 是本发明的结构方块示意图；

图 2 是本发明的操作流程图；

图 3 是本发明另一实施例的结构方块示意图；

请参图 1 本发明的结构方块示意图所示，由该图可看出，本发明主要由输入装置 1 、输入资料暂存装置 2 、识别与执行装置 3 及资料保存装置 4 所组成外部装置 7；其中：

输入装置 1 由数字电路、触摸式萤幕、或类似输入装置所组成，可以手写或其他方式输入图形、文字或符号。

输入资料暂存装置 2 由记忆体组成，可为随机存取记忆体、动态随机存取记忆体、静态随机存取记忆体、磁碟、软式磁碟片、光碟、或经网路边线的记忆装置；其是将上述由输入装置 1 所输入的图形、文字或符号暂存于记忆体中。

识别与执行装置 3 可由一中央处理单元构成，其依序执行预先设计的程序。

资料保存装置 4 由记忆体所组成，可为只读记忆体、可程式化只读记忆体、可擦可程式只读记忆体、遮罩的只读记忆体、随机存取记忆体、动态随机存取记忆体、静态随机存取记忆体、磁碟、软式磁碟片、硬碟、光碟、或经网路连线的记忆体装置；其是将控制开锁的密码资料及识别执行装置 3 所依序执行的程序，存放在装置的资料库中。

而，输入装置 1 的输出与输入资料暂存装置 2 的输入相连，辨认与执行装置 3 的输入分别与输入资料暂存装置 2 及资料保存装置 4 的输出相连，识别与执行装置 3 的输出分别与资料保存装置 4 的输入及外部装置 7 的输入相连。

另，可将电脑连接输入装置，利用其既有的中央处理单元及记忆体装置作为输入资料暂存装置 2 、资料保存装置 4 及识别与执行装置 3 ；如此不但可辨识使用者所输入的图像或笔迹，也可记录人员的出入。

请参图 2 为本发明的操作流程图（图像对比方式有许多种形式，非拘限于一种），其步骤有：

输入图像 51 ，在输入装置 1 上以手绘方式输入图像，然后进入输入是否完成 52 ；

输入是否完成 52 ，识别与执行装置 3 辨识使用者输入图像是否完成，若为“是”，则进入输入图像数字化 53 ，若为“否”，则进入输入图像 51 ，等待输入完成再继续动作；输入图像数字化 53 ，将输入的图像转换成数位图像资料，然后进入去除杂点 54 ；

去除杂点 54 ，将图像资料的杂点予以去除，然后进入完整化 55 ；

完整化 55，对图像资料抽取特征、座标化、线段化或曲线化，使形成完整图像，然后进入对比是否正确 56；对比是否正确 56，将图像资料与资料保存装置 4 中所储存的密码资料进行对比是否相同，若为“是”，则进入送出控制讯号 57，若为“否”，则进入显示错误讯息 58；

送出控制讯号 57，辨认与执行装置 3 送出控制开锁或启动执行讯号至外部装置 7；

显示错误讯息 58，显示一错误讯息让使用者了解输入错误再进入输入图像 51。

上述的执行及控制手段可由识别与执行装置 3 依序执行存放在资料保存装置 4 的程式码来完成，而所输入的图像也可为符号或文字。

请参图 3 为本发明另一实施例，其主要由笔迹座标输入装置 61、笔迹数字化处理装置 62、笔迹特征抽取装置 63、执行动作识别装置 64、笔迹储存装置 65 所组成，用以启闭外部装置 7；其中，笔迹座标输入装置 61，由数字电路或其他可输入笔迹的装置将使用者的笔迹输入。

笔迹数字化处理装置 62，将使用者输入的笔迹数字化及去除杂点。

笔迹特征抽取装置 63，将使用者输入的笔迹图像化、线段化或曲线化。

执行动作识别装置 64，对比使用者输入的笔迹与识别用预存的笔迹，以决定是否送出开或启动装置的讯号至外部装置 7。

笔迹储存装置 65，储存识别用的笔迹。

然而，即使用同一个人，每次写出来的字也会有些不同，因此，比较输入图像与密码资料是否相同，也可以相似作为基准，而近似程度百分比可以依需要调整，使其更具实用性。

综上所述，本案所发明的用图像控制开锁或装置启动的方法及装置，确已具有产业利用性、新颖性与进步性。

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说明书附图

图1

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图2

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笔迹座标
输入装置
61
笔迹数位化
处理装置
62
笔迹特征
抽取装置
63
7
外部装置
执行动作
辨认装置
64
笔迹储存装置
65

图 3